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Complexity in Chinese herbal medicine supply chains

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Complexity in Chinese herbal medicine supply chains

Exploration and evaluation using thematic analysis

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Prof. Volker Scheid - University of Westminster, London
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Summary

Introduce Supply Chain Complexity (SCCx) study as a concept

Whats the problem - isn't everything OK?

Novel methodology approach to analysis of the supply chains - integrated manner

Simplification

Simple model for analysis

Results / Conclusion / invitation



Chinese Medicine importance?

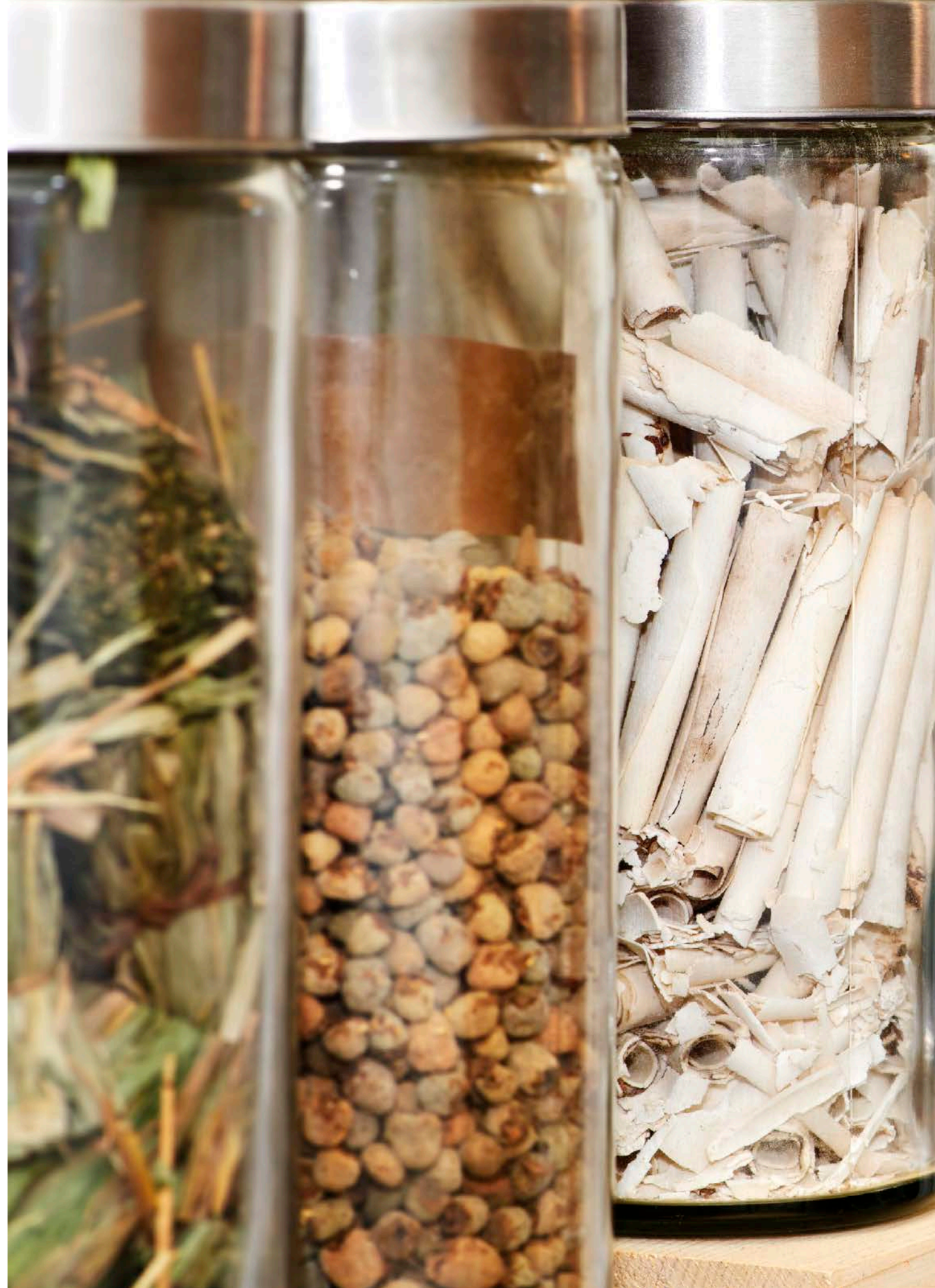
80% world population use

Large knowledge base amassed

Side effects from drugs

New Drug Pipeline is drying up

Still new and adapting diseases



Has usage changed?

Traditionally - local healer local use

Grown locally

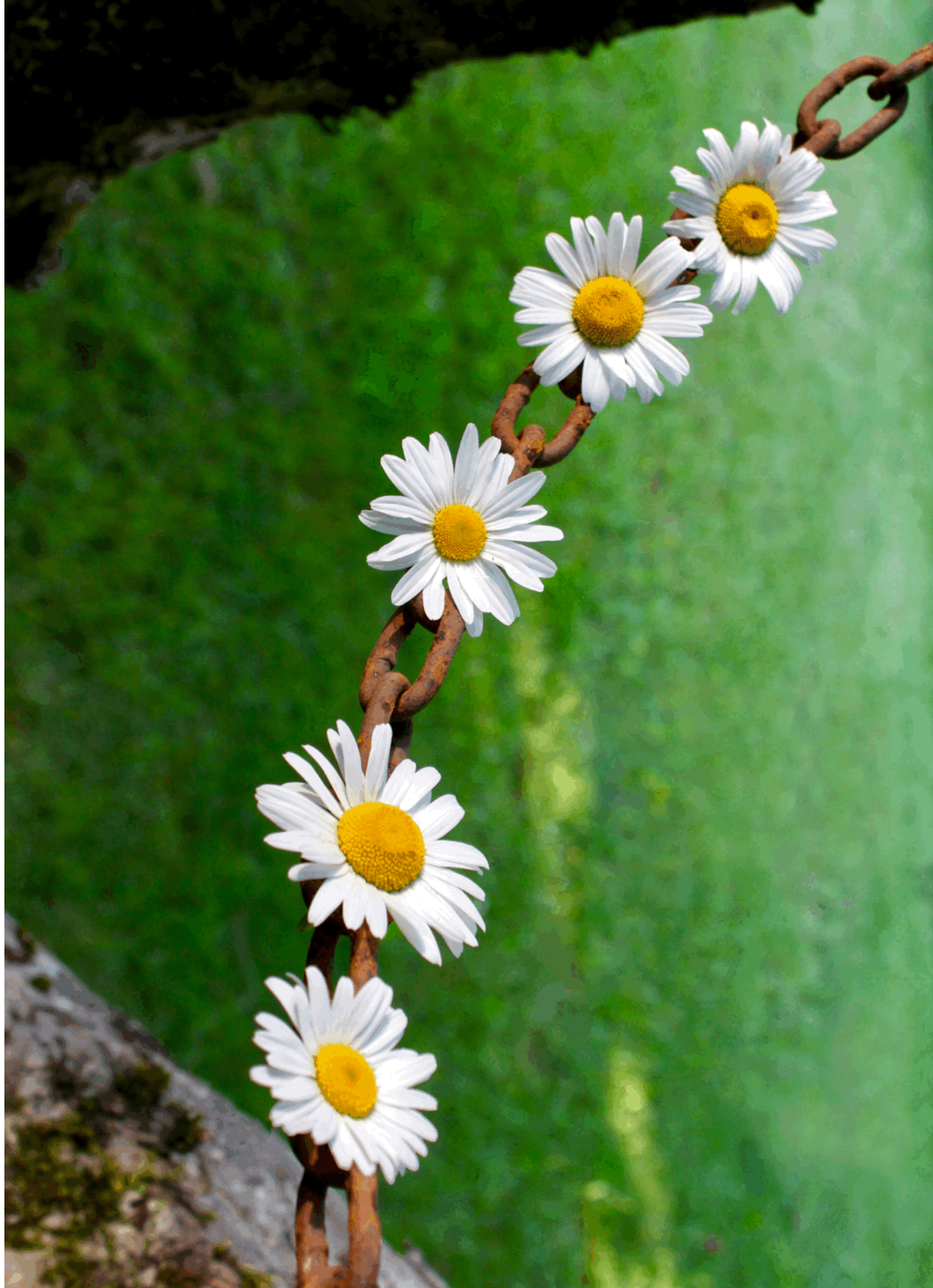
Expanded use - Expanded regions



Supply Chain

Increased in length

increased in complexity



Is Complexity a problem?

Surely more supply and advancement is beneficial?

Greater usage - greater benefits?

Many things become more complex as they advance

What's the problem?



The problem of Complexity

Supply chains developing by value factors - not by need or optimal benefit

Value influence is complex - multi-factorial

More Complexity -> less visibility

Local -> Distant -> Quality challenges

Quality challenges -> potential fatalities



Quality Failures

Many

ID

Contamination - aflatoxins, heavy metals

Adulteration - pharmaceuticals / dyes

Many more



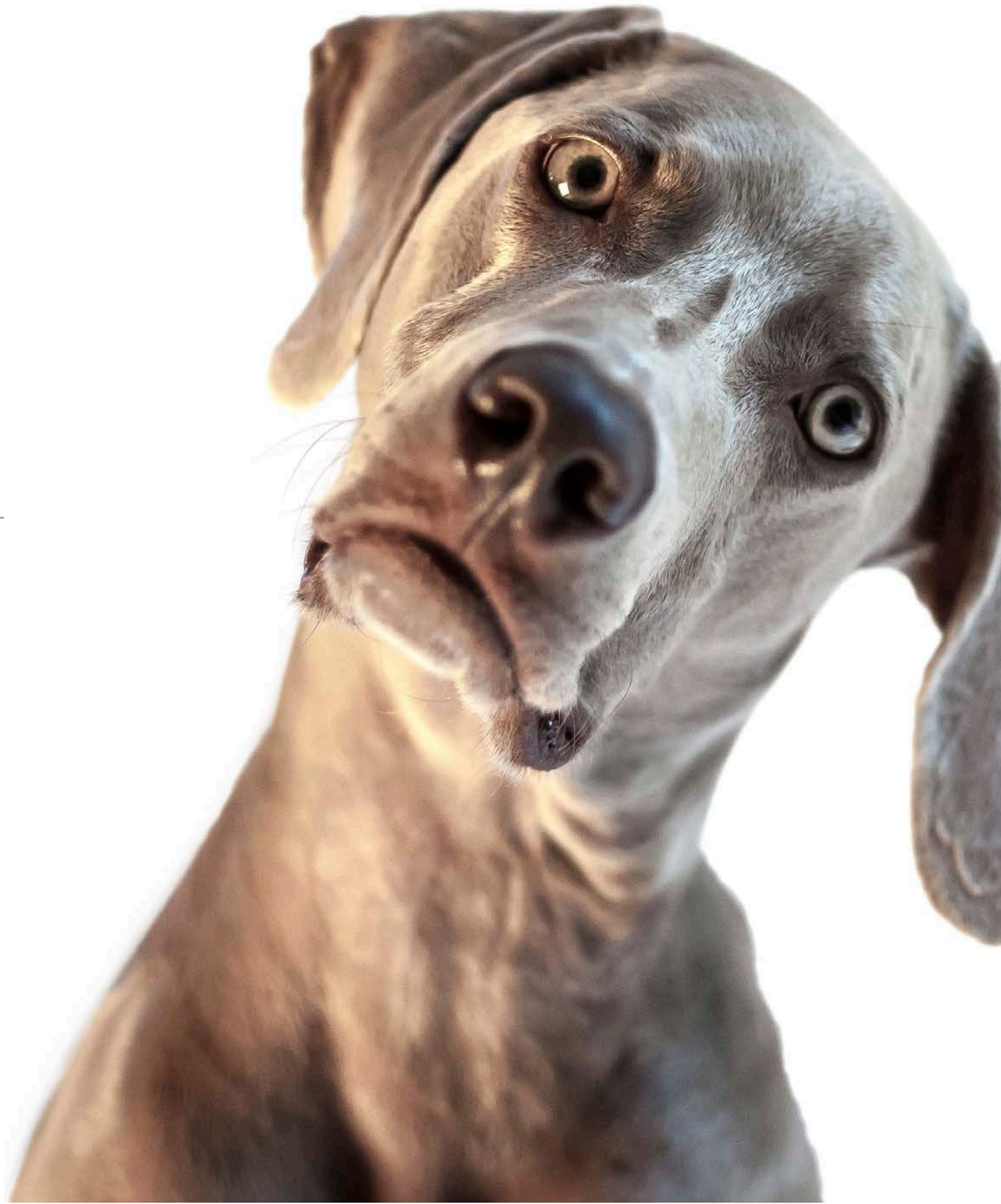
Analysis

ID was no problem for one person locally

but now

too many herbs to know - too many new formulations

Complexity - confusion

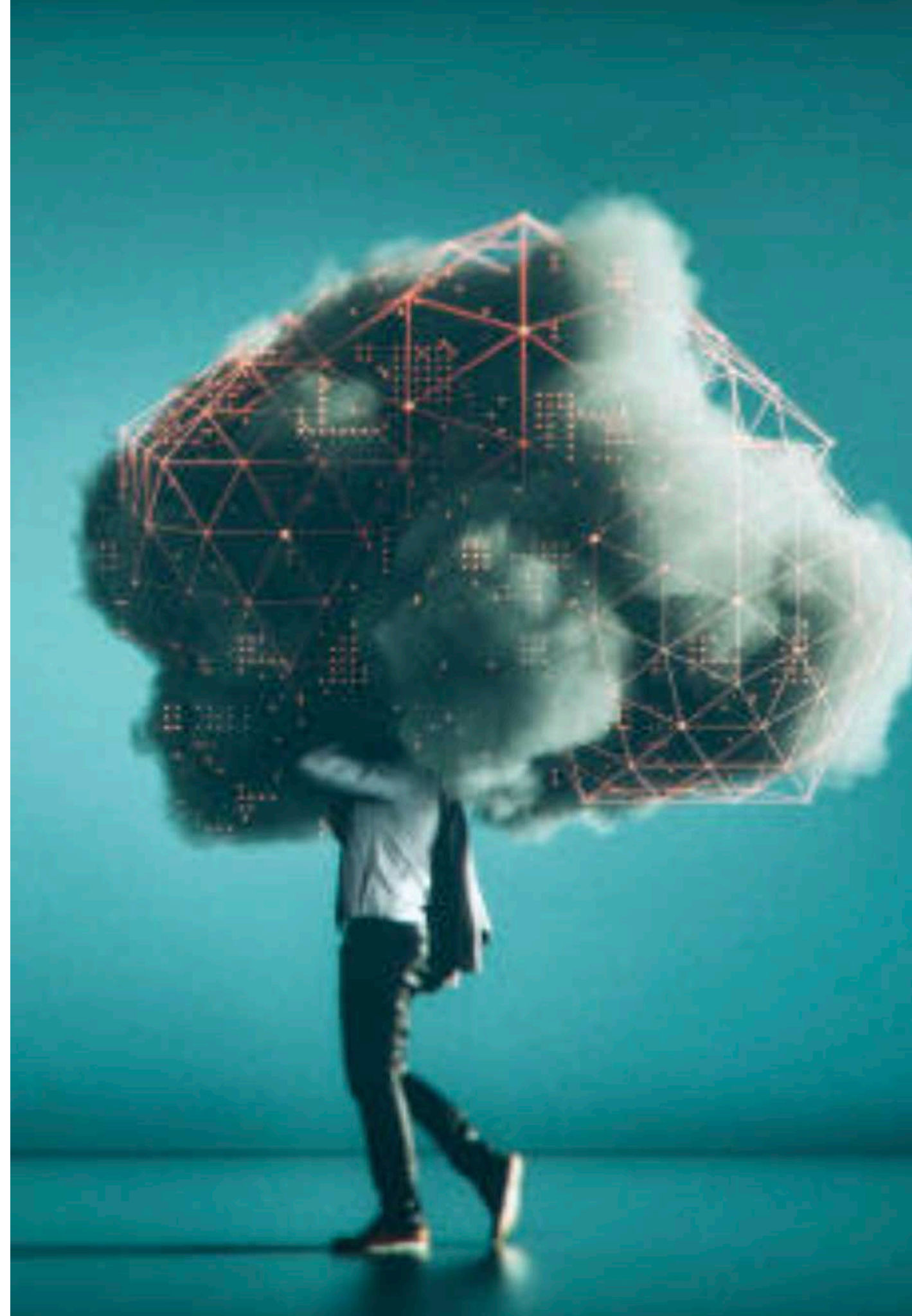


What are the the Solutions so far?

More Regulation
More Testing
More Research

More Complexity
Less overall control and adaptivity

Reactive solutions - Complex solutions
Less cohesion - More fragmentation

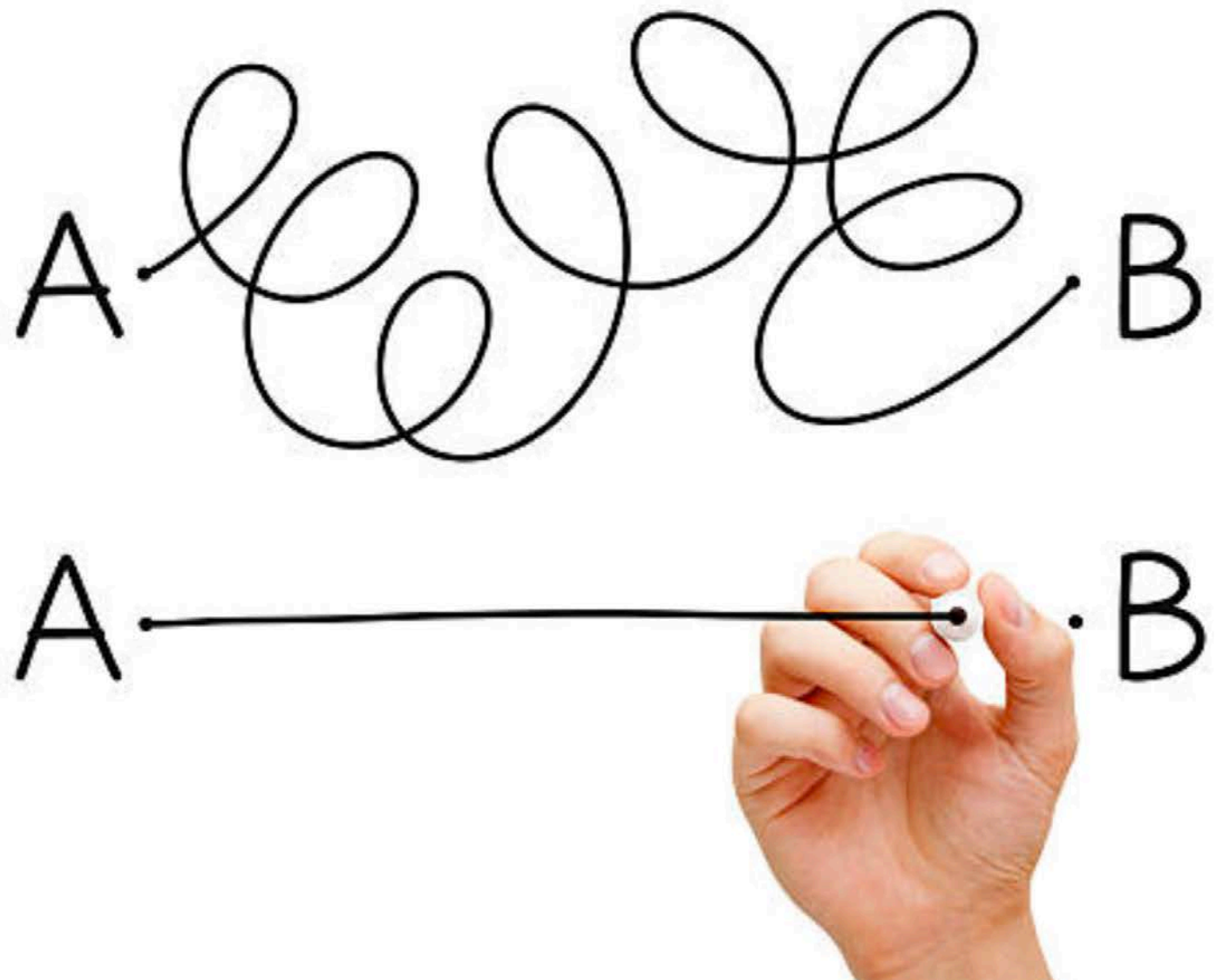


Is studying **SCCx** a solution?

Development of supply Chain Complexity (**SCCx**) study as a concept

SCCx groups common factors - reducing fragmentation

Aim: Cohesive analysis - simpler solutions



Defining Chinese Medicine Supply Chain

Many definition of Supply Chains

None adequate form CHM Supply Chain

“A chain of multiple entities directly involved in the flow of Chinese herbal medicine product, service, finance, value and / or information from source to customer”

Defining Chinese Medicine Supply Chain **Model**

Many definition of Supply Chains

None adequate form CHM Supply
Chain

*Booker-Heinrich
Value Chain**

* Booker A, Johnston, D. and Heinrich, M. (2012). Value chains of herbal medicines—Research needs and key challenges in the context of ethnopharmacology. *Journal of ethnopharmacology*, 140(3), pp.624-633.

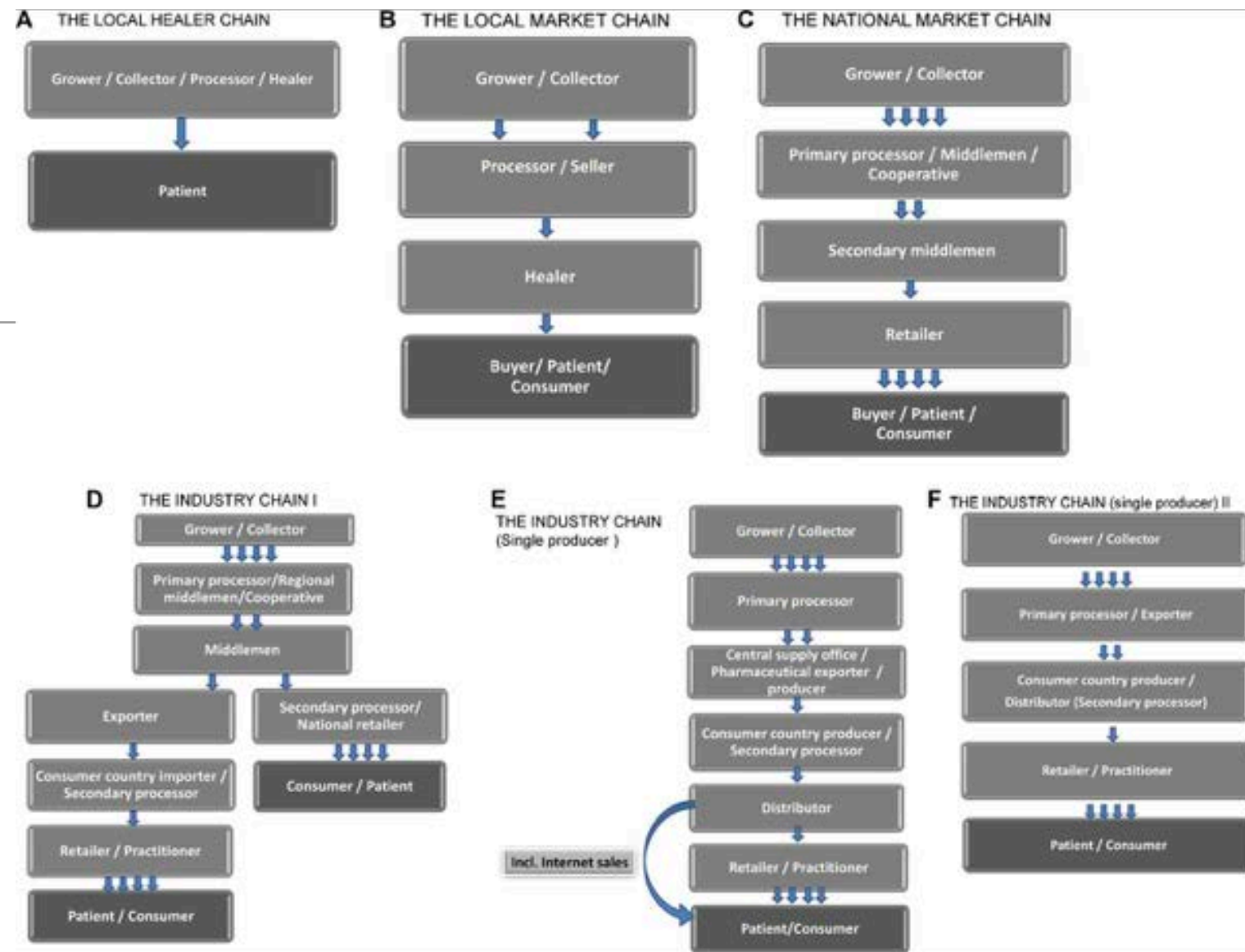
Chinese Medicine Supply Chain Model

Model

Complete

Defined

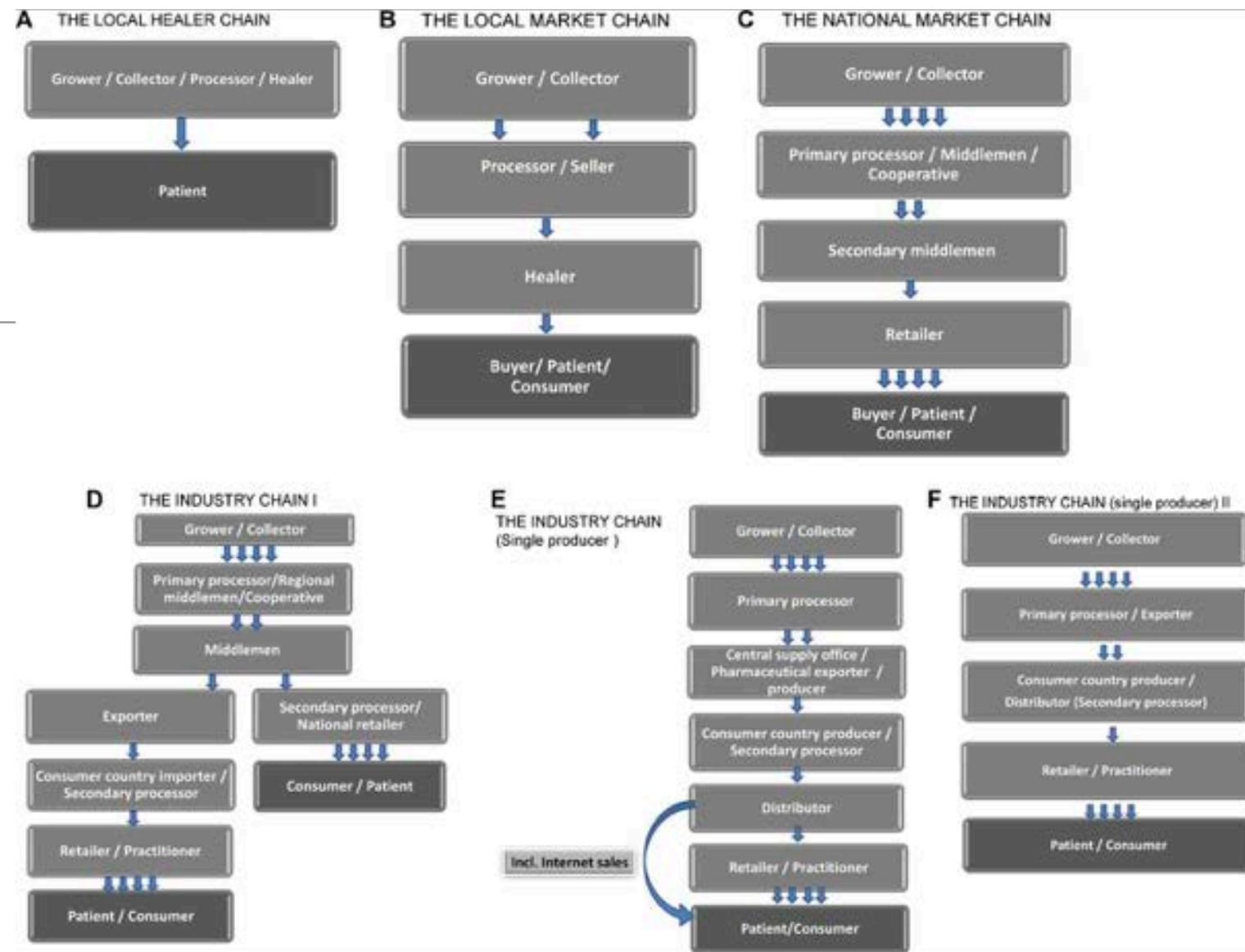
Developed



Simple Chinese Medicine Supply Chain Model

Model

Complete



Simple Chinese Medicine Supply Chain Model

Booker-Heinrich Supply Chain Model Reduction

Booker-Heinrich Supply Chain Component Reduction Model

Booker-Heinrich Supply Chain Component Reduction (Step 2 of 4)

	Local Healer	Market (Local)	Market (National)	Industry	Industry (Single I)	Industry (Single II)
Cultivation	Grower	Grower	Grower	Grower	Grower	Grower
	Collector	Collector	Collector	Collector	Collector	Collector
Processing	Processor	Processor	Primary Processor	Primary Processor	Primary Processor	Primary Processor
Middlemen			Middlemen	Regional middlemen		
			Cooperative	Cooperative		
					Central supply office	
			Secondary middlemen	Middlemen		
Export				Exporter	Pharmaceutical exporter	Exporter
Import				Consumer country importer		
Processing				Secondary processor	Producer	
					Consumer country producer	Consumer country producer
					Secondary processor	Distributor (Secondary processor)
Sales		Seller	Retailer	National retailer	Retailer	
		Buyer	Buyer	Retailer		Retailer
Distribution					Distributor	
Practitioner	Healer	Healer		Practitioner	Practitioner	Practitioner
Consumer		Patient	Patient	Patient	Patient	Patient
	Patient	Consumer	Consumer	Consumer	Consumer	Consumer
Number of steps in model	2	4	5	9	7	5
Number of components	5	8	10	14	13	10

Simple Chinese Medicine Supply Chain Model

Booker-Heinrich Supply Chain
Model **Reduction**

*Booker-Heinrich Supply Chain
Component Reduction Model*

	Local Healer	Market (Local)	Market (National)	Industry	Industry (Single I)	Industry (Single II)
Cultivation	√	√	√	√	√	√
Processing	√	√	√	√	√	√
Middlemen			√	√	√	
Export				√	√	√
Import				√		
Trading		√	√	√	√	√
		√	√	√	√	√
Distribution					√	
Practitioner	√	√		√	√	√
Consumer	√	√	√	√	√	√
Number of steps in model	2	4	5	9	7	5
Number of components	4	6	6	9	9	7

Supply Chain Model

Booker-Heinrich Supply Chain
Model Reduction

Complete

Simple

*Booker-Heinrich Supply Chain
Component Reduction Model*

Cultivation
Processing
Middlemen
Export / Import
Trading
Distribution
Practitioner
Consumer

Thematic Analysis of SCCx

Systematic literature review
Human

Text Data mining Software

Results

Search - 11 Databases

Keywords: “Chinese herbal medicine, complexity, problems”

Alternative Health Watch (AltHealthWatch)	ERCA
AMED	Science direct
Biological science	MedlinePubMed (NLM)
Medline (CSA)	Cochrane database
Google Scholar	University of Westminster, London Library Database collections
Web of science	

325 relevant results
302 were excluded

Quality check CASP - 10 point checklist
“Critical Appraisal”

23 were included.

Thematic Analysis of SCCx

Systematic literature review Human

Text Data mining **Software**

Results



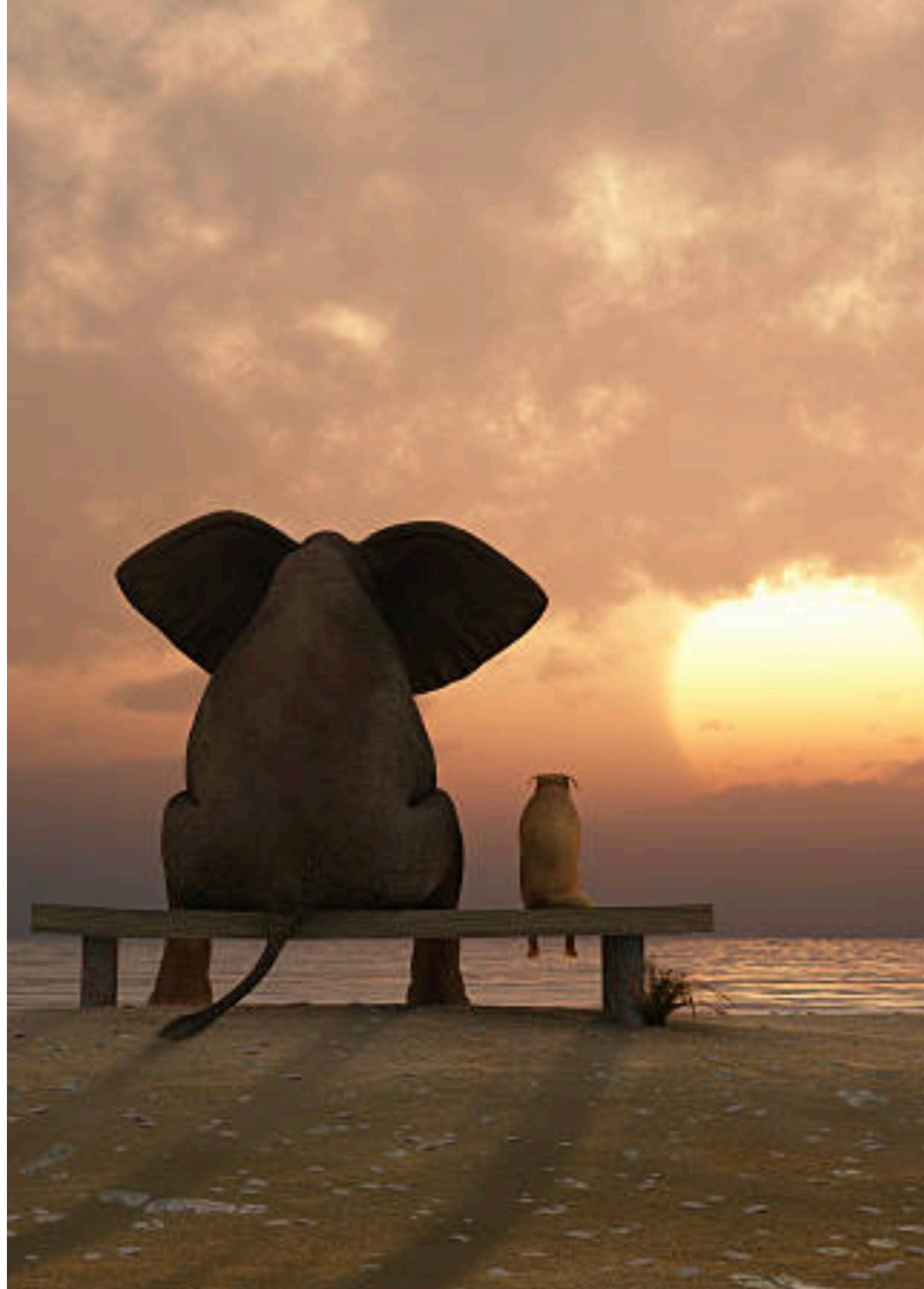
Thematic Analysis

Problem - influenced by observer bias

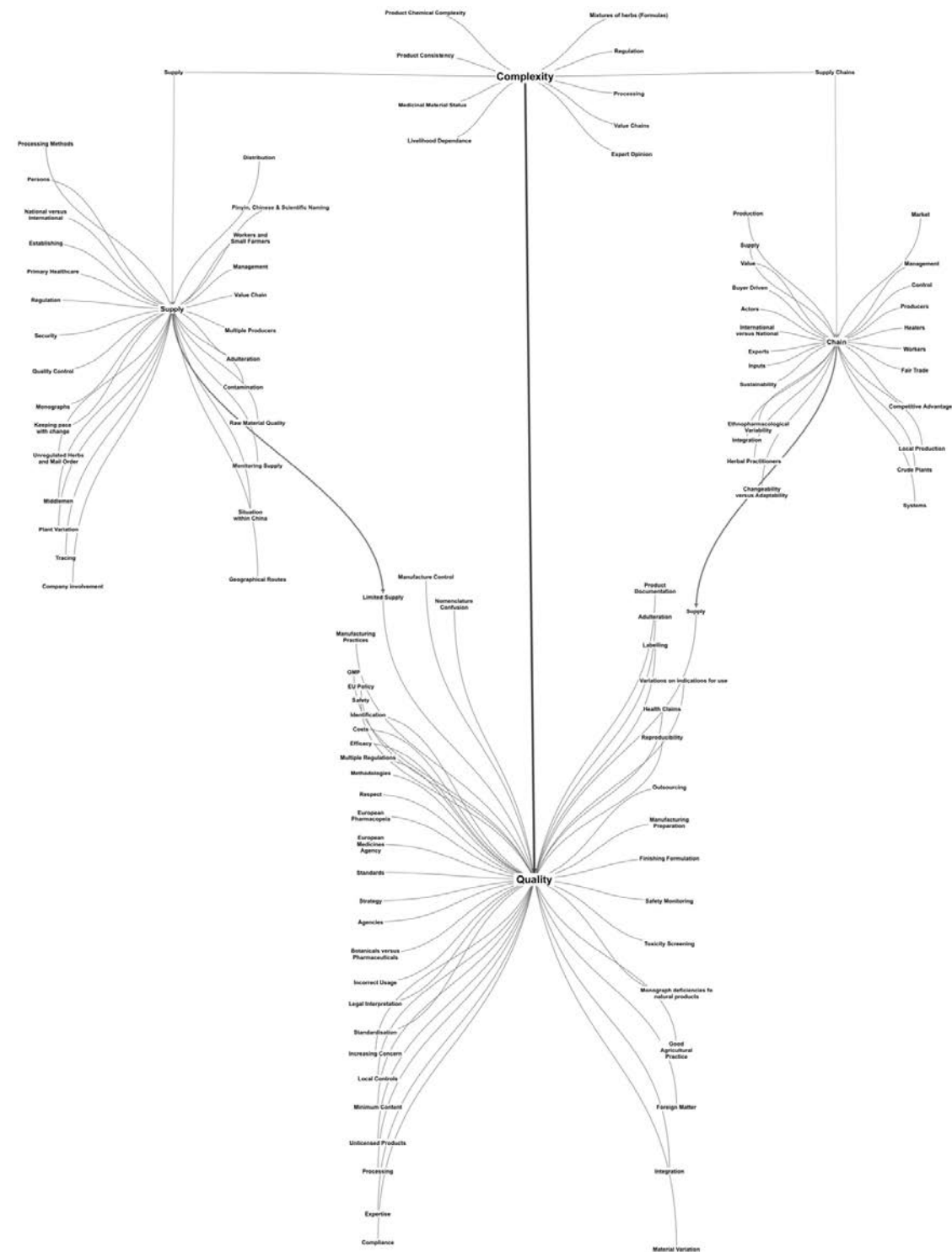
Solution - computer aided frequency correlation

Results?

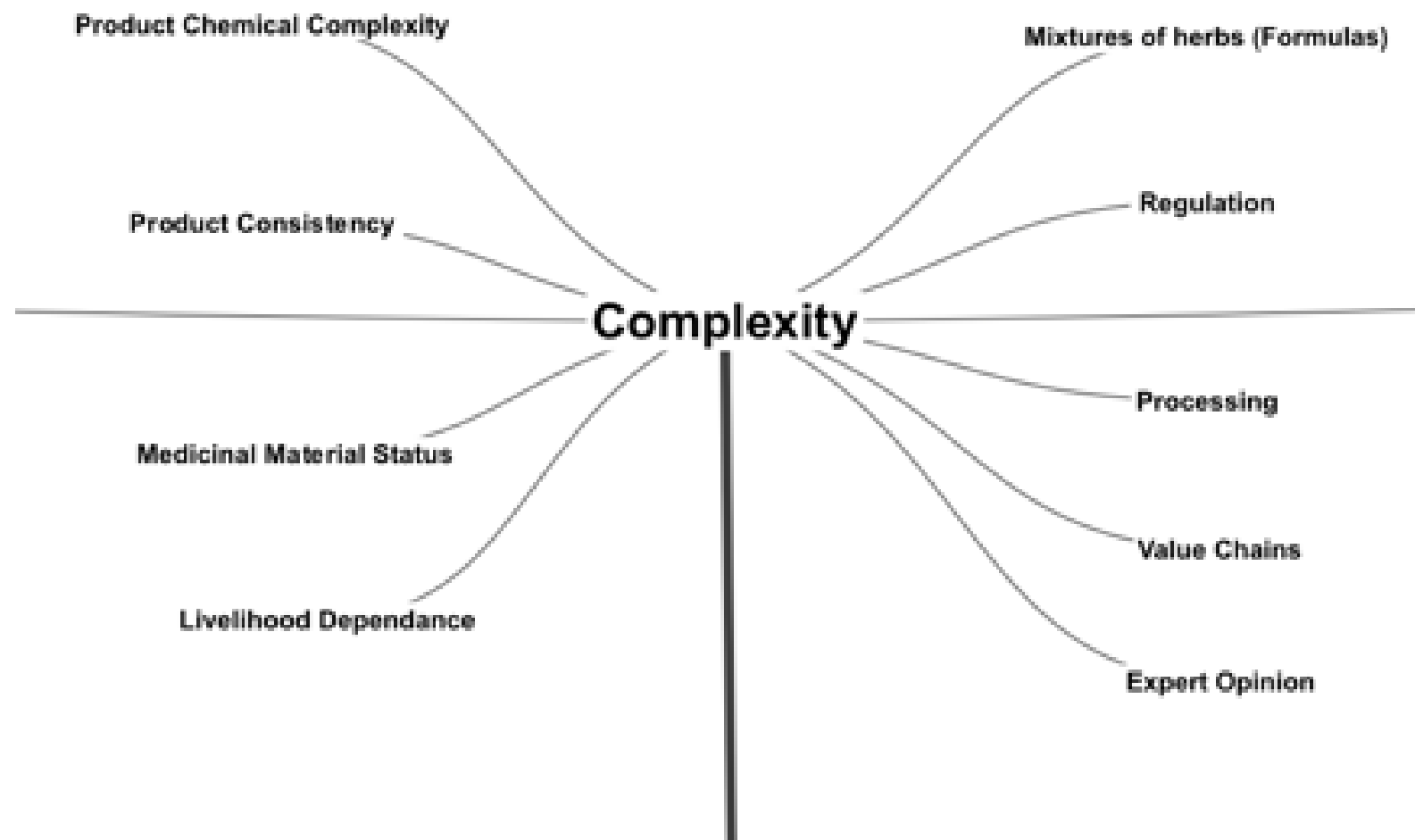
Simple?



Thematic Analysis Results Output



Thematic Analysis Results Text Mining **Output**



Thematic Analysis

Thematic creation

Braun and Clark, 2006 *

Thematic synthesis

Thomas and Harden, 2008 **

Complexity Factor theme generation

1	Familiarizing yourself with your data
2	Generating initial codes:
3	Searching for themes:
4	Reviewing themes:
5	Defining and naming themes:
6	Producing a thematic report

* Braun, V and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative research in psychology*. 3(2), pp.77-101.

** Thomas, J. and Harden A., (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC medical methodology*, 8(1), p45.

Thematic Analysis

Thematic creation
Braun and Clark, 2006

Thematic synthesis
Thomas and Harden, 2008

Complexity Factor theme generation

Themes	Complexity Factor Number
Livelihood Dependence	Cf1
Expert Opinion	Cf2
Product Consistency	Cf3
Processing	Cf4
Product Chemical Complexity	Cf5
Mixtures of Herbs (Formulas)	Cf6
Medicinal Material Status	Cf7
Regulation	Cf8
Value Chains	Cf9

Thematic Analysis

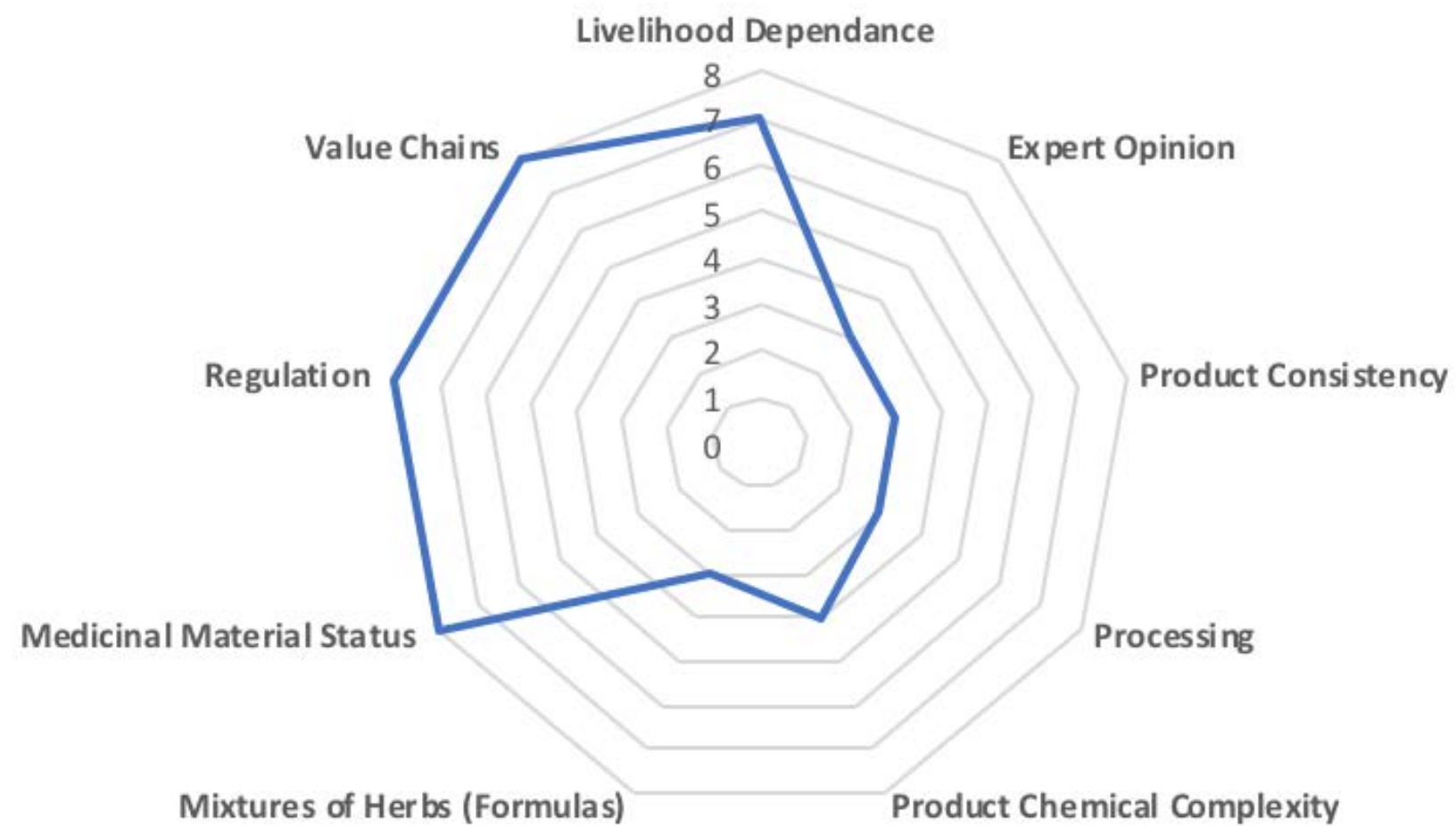
Thematic creation
Braun and Clark, 2006

Thematic synthesis
Thomas and Harden, 2008

Complexity Factor theme generation

Major Theme	Minor Theme	Complexity Factor Number
Human Complexity	Livelihood Dependence	Cf1
	Expert Opinion	Cf2
Product Complexity	Product Consistency	Cf3
	Processing	Cf4
	Product Chemical Complexity	Cf5
	Mixtures of Herbs (Formulas)	Cf6
Conceptual Complexity	Medicinal Material Status	Cf7
	Regulation	Cf8
	Value Chains	Cf9

Number of complexity factors for 9 themes of complexity for the complete supply chain



Cultivation

Processing

Middlemen

Export /
Import

Trading

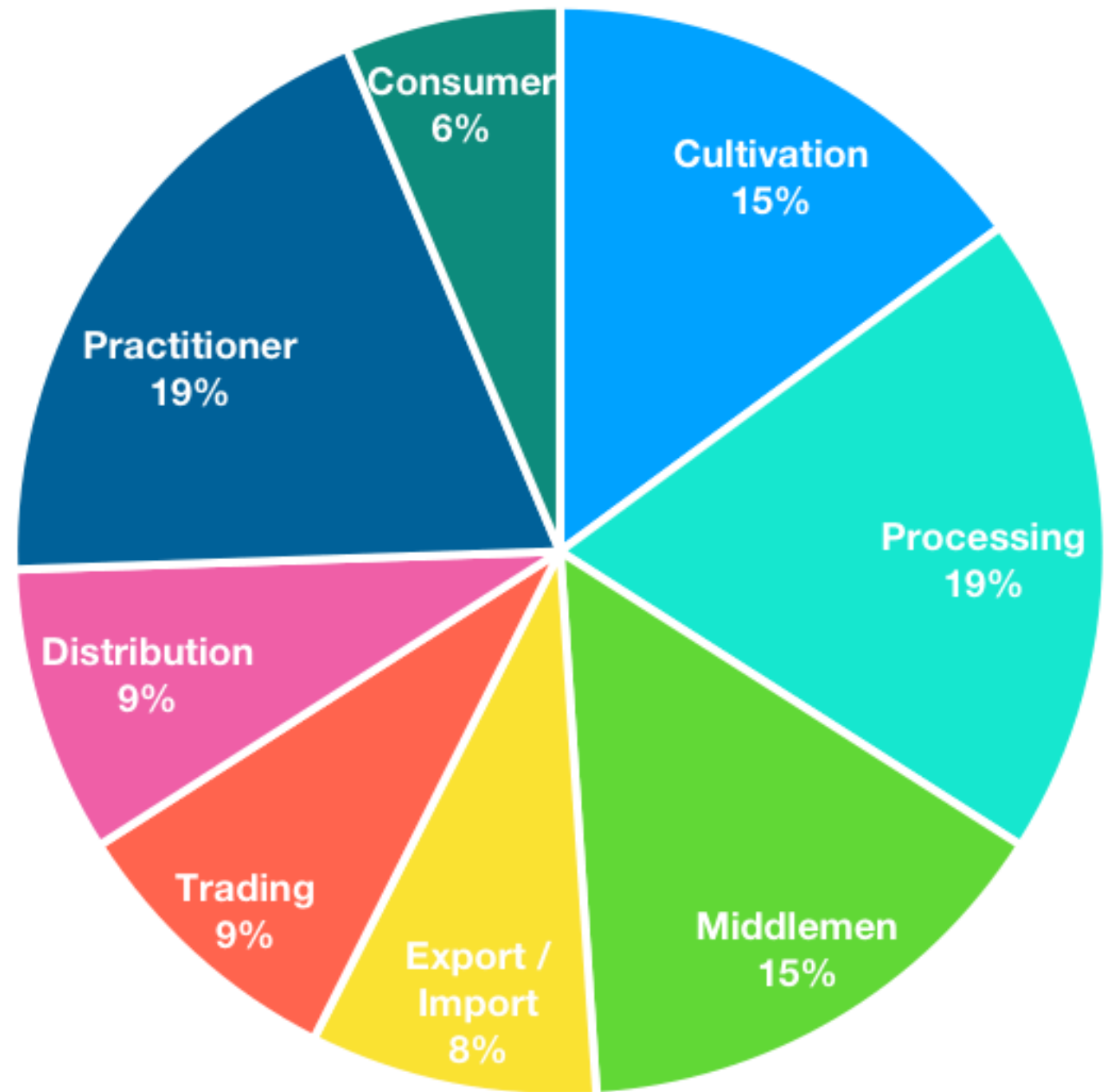
Distribution

Practitioner

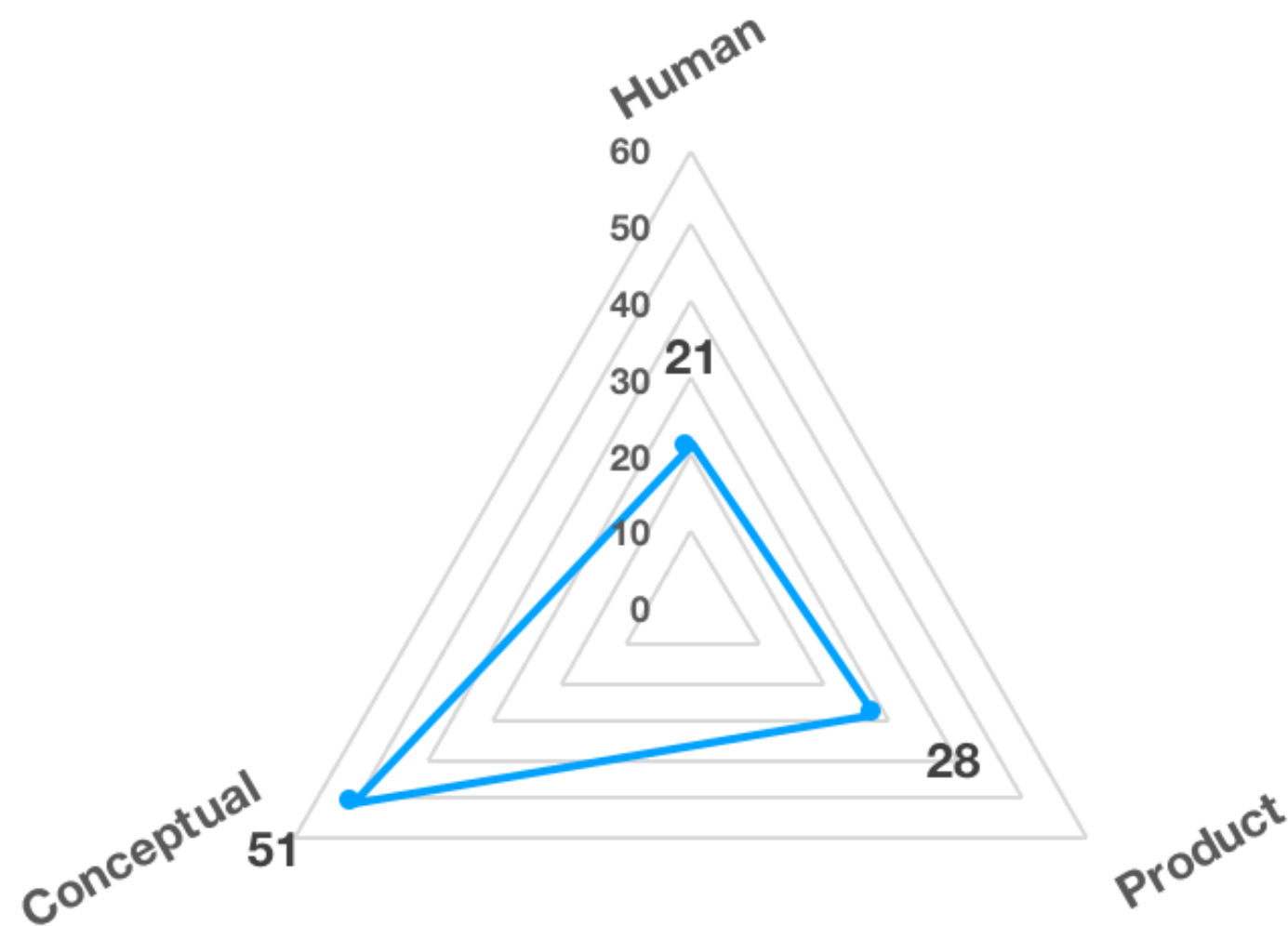
Consumer

Thematic Analysis

% Contribution of Complexity factors in BH-RSC



% Complexity factors contributions for Major Themes



Major Theme	Minor Theme
Human Complexity	Livelihood Dependence
	Expert Opinion
Product Complexity	Product Consistency
	Processing
	Product Chemical Complexity
	Mixtures of Herbs (Formulas)
Conceptual Complexity	Medicinal Material Status
	Regulation
	Value Chains

New approach to exploring
and evaluating CHM Supply
Chains based on BH-VC
Model

Conclusions

**New approach to analysing
Supply Chains**

Conceptual Complexity

Aim: Cohesive analysis - simpler
solutions

New approach to exploring
and evaluating CHM Supply
Chains based on BH-VC
Model

*“Focusing on reducing
Conceptual complexity factors
may be a more effective
approach to simplifying the
supply of CHM”*

Conclusions

New approach to analysing Supply
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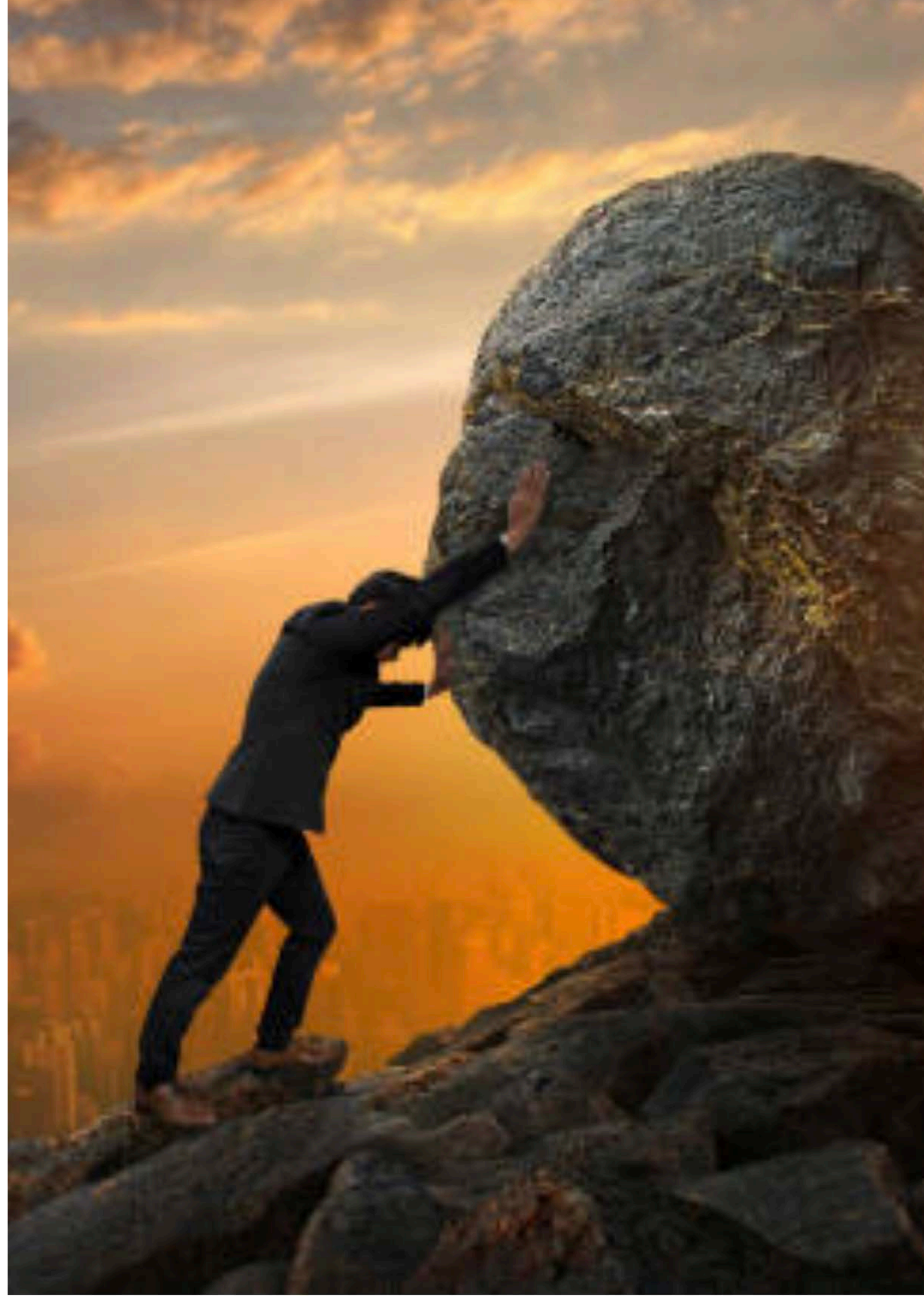
New approach to analysing Supply
Chains

Conceptual Complexity

**Aim: Cohesive analysis - simpler
solutions**

Aim outcome: Simplification of
regulation, herbal medicine
status and value chains

2 Major Problems with this approach?





2 Problems with this approach?

1. **Theoretical** Framework only

It is not based on what we see in practice

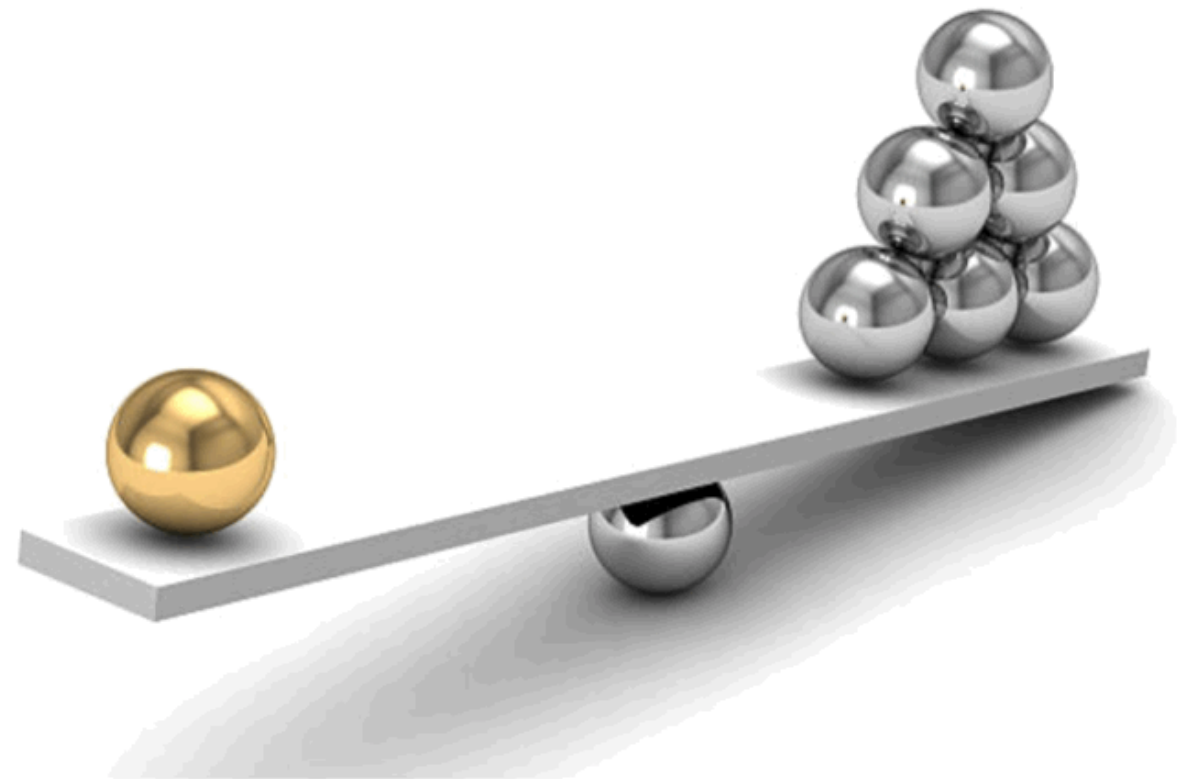
2 Problems with this approach?

1. **Theoretical** Framework only

It is not based on what we see in practice

2. Based on **frequency** in literature

Not on size effect or importance



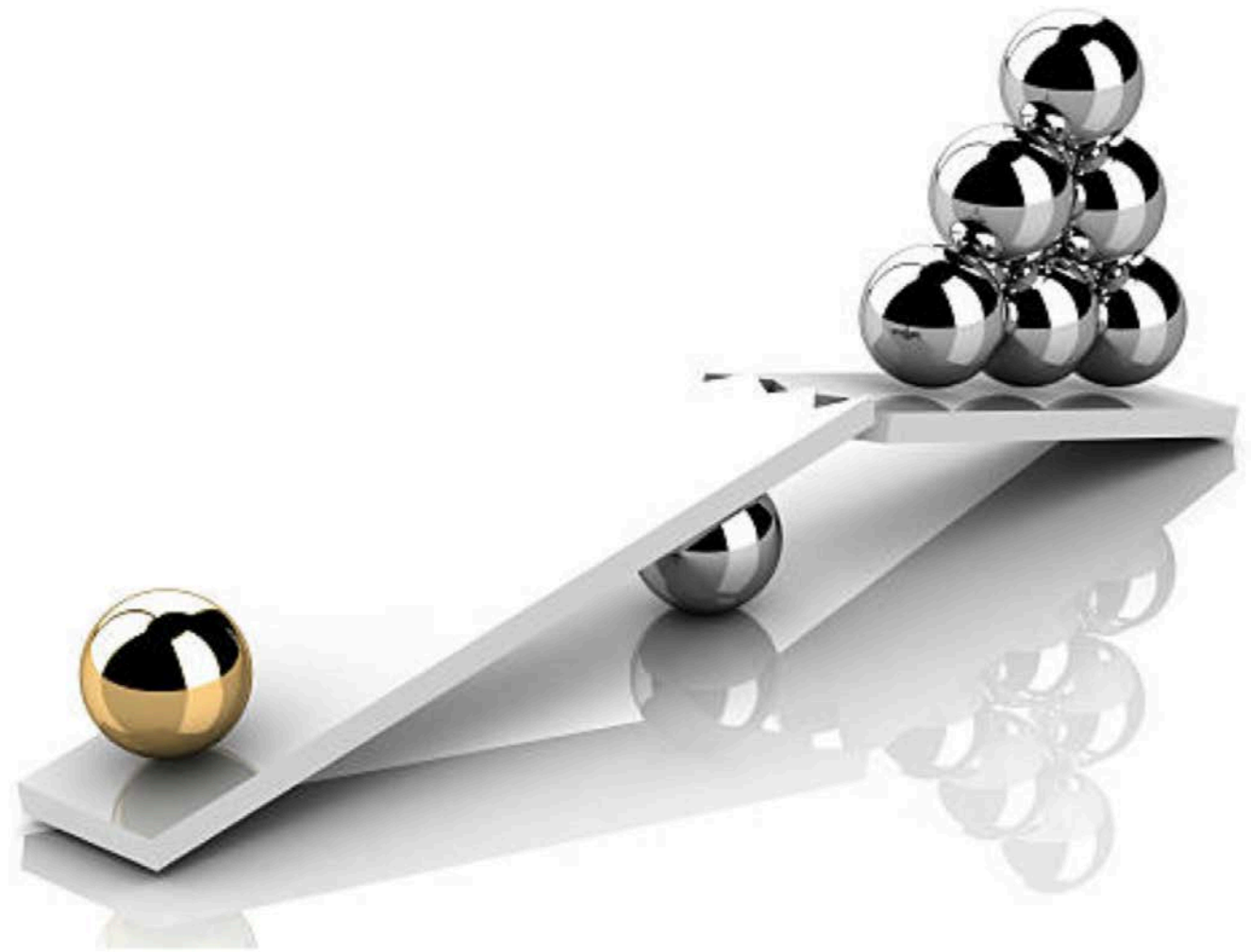
2 Advantages with this approach?

1. **Theoretical** Framework only

It is not based on what we see in practice

2. Based on **frequency** in literature

Not on size effect or importance



How to verify / validate or reject?

1. Theoretical Framework only

It is not based on what we see in
practice



How to verify / validate or reject?

Practical ethnographic work

Follow through on different supply
chains

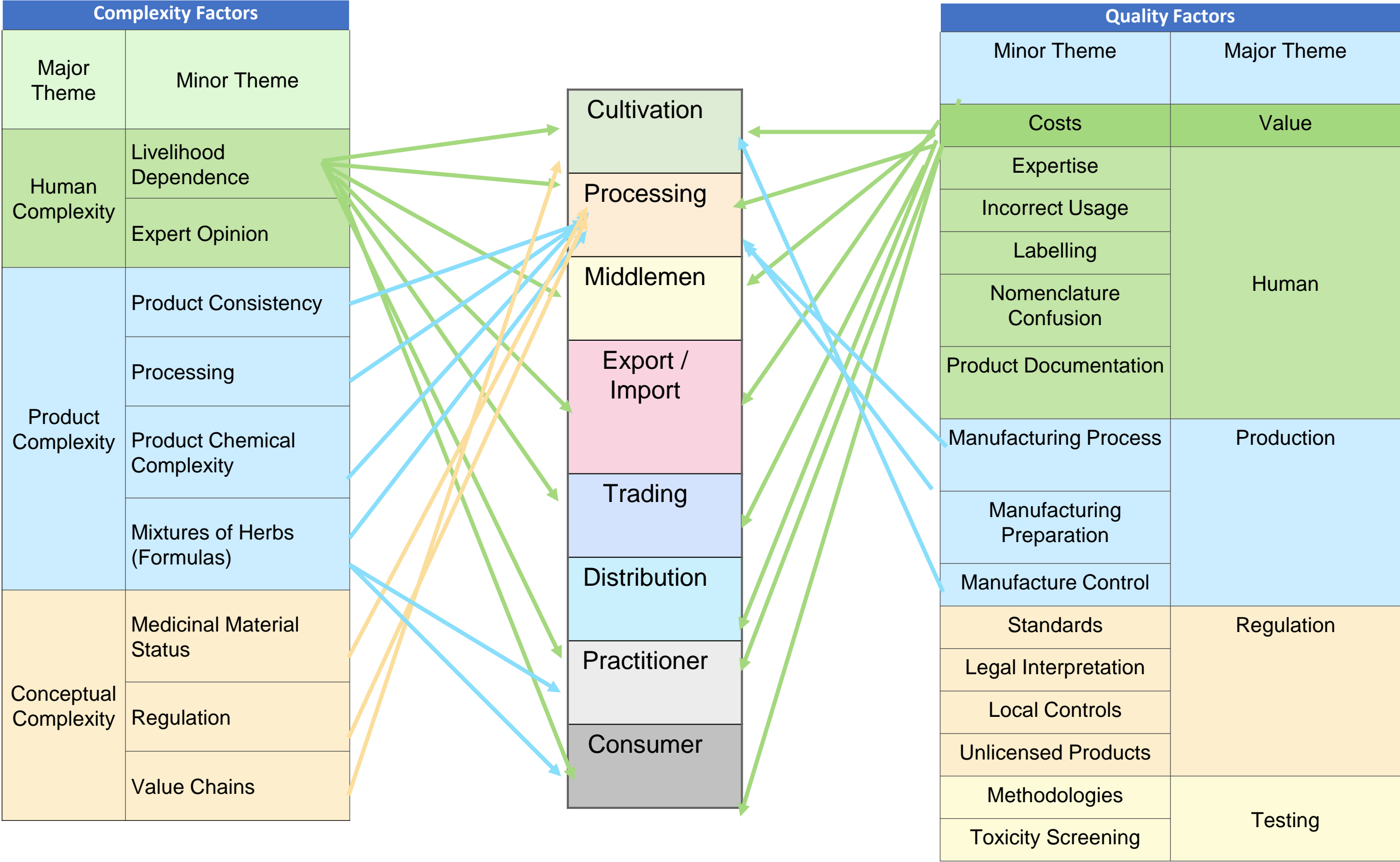
Collaboration with other researcher
findings



Complexity Factors	
Major Theme	Minor Theme
Human Complexity	Livelihood Dependence
	Expert Opinion
Product Complexity	Product Consistency
	Processing
	Product Chemical Complexity
	Mixtures of Herbs (Formulas)
Conceptual Complexity	Medicinal Material Status
	Regulation
	Value Chains

Cultivation
Processing
Middlemen
Export / Import
Trading
Distribution
Practitioner
Consumer

Quality Factors	
Minor Theme	Major Theme
Costs	Value
Expertise	Human
Incorrect Usage	
Labelling	
Nomenclature Confusion	
Product Documentation	Production
Manufacturing Process	
Manufacturing Preparation	
Manufacture Control	Regulation
Standards	
Legal Interpretation	
Local Controls	
Unlicensed Products	Testing
Methodologies	
Toxicity Screening	



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Complexity in Chinese Medicine Supply Chains

SCCx

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&

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THANK YOU

非常感谢

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